POSITION DESCRIPTION

Position Title: Astronomical Optics Scientist I and II, Sr. Astronomical Optics Scientist, Principal Astronomical Optics Scientist
Division: Instruments Division
Branch: Telescopes Group
FLSA Status: Exempt
EEO Class: Professional
HR Codes: Level I Grade= 84 Job Code=8314, Level II Grade= 85 Job Code=8169, Senior Grade= 86 Job Code=8181, Principal Grade= 87 Job Code=8301

BASIC FUNCTION:

Provides scientific, technical, computational, and hardware expertise; and leadership relating to the characterization of the optical systems of the astronomical missions supported at STScI. This includes the James Webb Telescope (JWST), the Hubble Space Telescope (HST), and other current or future missions, with an emphasis on telescope optics and/or the science instruments. Uses optical modeling to predict telescope/instrument alignment and wavefront quality. Performs phase retrieval and other optical and astronomical analysis methods to model and analyze simulated, test, or astronomical data. Participates in relevant Integration & Testing activities. Performs scientific assessment of telescope/instrument performance, and advises STScI management, external stakeholders, and the astronomical community.

ESSENTIAL DUTIES & RESPONSIBILITIES:

The Astronomical Optics Scientist carries out a subset of the following tasks:

1. JWST: Create and maintain a fundamental understanding of the JWST optical prescription and existing optical models for the telescope and its instruments. Create and interpret new detailed optical models to characterize the JWST optical train and its imaging and optical quality using geometrical and physical optics analysis. Use the knowledge gained to support the alignment of the telescope during Integration & Testing. Assess and improve the existing strategies to maintain the JWST image quality through phase retrieval and wavefront sensing techniques. Assess through modeling how image quality will be affected by thermal and mechanical effects while in orbit, and how sensitivity will be affected through stray light. Assess the coronagraphic capabilities of the JWST instruments through detailed modeling. Support STScI in the creation of operational strategies that optimize image quality and observatory efficiency. Support the astronomical community in understanding the image quality of JWST to ensure maximum scientific output from the observatory.

2. HST: Create and maintain a high-level understanding of the HST optical system. Track telescope focus by phase retrieval of calibration observations. Understand, support and
calibrate instrument modes by analyzing HST images and using optical modeling techniques. Participate in relevant anomaly investigation teams.

3. Other missions: Understand and support the development of the optical design of other missions in which STScI is or may become involved including imaging and/or coronagraphic capabilities. Create and interpret new detailed optical models to characterize the optical train and its imaging and optical quality using geometrical and physical optics analysis. Support the astronomical community in understanding the image quality to ensure maximum scientific output from the observatory. Create software for predicting and modeling the image quality. Participate in design and trade studies, and represent STScI in relevant teams and committees.

4. Research: Conduct optics, astronomical or other scientific research in support of grant funded programs, or as supported by other means (subject to availability of funding). Includes publication of results, attendance of conferences, talks and presentations, etc.

5. General: Share expertise with colleagues at STScI. Contribute in a broad sense to the activities of the Group, the Division, and STScI as a whole. Have discussions with individuals doing related work at NASA and industry on STScI associated projects to improve general technical understanding and optimal use of optical analytical techniques. Support required computing software and hardware needed for optical analysis.

SUPERVISION EXERCISED:

No formal managerial supervision is exercised. But in the higher grades of this track, the Astronomical Optics Scientist will be expected to lead technical teams, and to supervise or mentor the work of more junior colleagues.

SUPERVISION RECEIVED:

Works under the direction of the INS/TEL Group Lead, with additional guidance from STScI Mission Office representatives. Works in collaboration with experts in a wide range of areas from across STScI and other partner institutions.

MINIMUM QUALIFICATIONS:

KNOWLEDGE, SKILLS & ABILITIES:

A. Ability to formulate and resolve scientific and technical problems independently through research and application of physical, mathematical, astronomical and computational techniques.

B. Advanced knowledge of physical optics and ability to create and manipulate optical models of complex systems.

C. Practical knowledge of phase retrieval and image reconstruction methods.

D. Good working knowledge of commonly used optical modeling software packages (e.g., Code V, ZEMAX, OSLO, FRED, etc.)
E. Substantial programming skills in high-level languages (e.g., Python, IDL, C or FORTRAN, etc.)

F. Ability to establish and maintain effective working relationships internally and externally and to work effectively in cross-disciplinary teams.

G. Effective verbal and written communication skills used in preparation of reports, proceedings or journal articles, and talks.

EDUCATION:

Master's degree in optics; or Bachelor's or higher level degree in another field but with equivalent experience in optical analysis.

Senior and Principal: A PhD degree is strongly preferred.

EXPERIENCE:

Experience is required in scientific research, technical support, software development and/or data analysis in the area of the optical performance, analysis, design, integration and/or testing of astronomical telescopes/instruments, or astronomically relevant optical systems.

Level I: Some practical experience (e.g., as part of education or prior positions).

Level II: Five or more years of experience.

Senior: Ten or more years of experience. Experience in a leadership role preferred.

Principal: Fifteen or more years of experience. Experience in a leadership role expected.

At all levels, a commensurate written record (e.g., refereed papers, conference papers, or technical reports/presentations) is expected to demonstrate the experience and the quality of the work.

Any of the following would be beneficial, but is not a requirement: experience with optical systems in space; experience with optical hardware design, integration and testing; experience in astronomical research and familiarity with astronomical data reduction.

NOTE: Level of appointment will be commensurate with the candidate's qualifications. Substitution of additional relevant education or experience for stated qualifications may be considered.

Work Environment:
The work environment characteristics described here are representative of those an employee encounters while performing the essential functions of this job. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential functions.

- The noise level in the work environment is usually quiet.
Physical Demands:

The physical demands described here are representative of those that must be met by an employee to successfully perform the essential functions of this job. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential functions.

- While performing the duties of this job, the employee is regularly required to sit; use hands to finger, handle, or feel and talk or hear.
- The employee is occasionally required to stand; walk; reach with hands and arms and stoop, kneel, crouch, or crawl.
- The employee must regularly lift and/or move up to 10 pounds and occasionally lift and/or move up to 25 pounds.
- Specific vision abilities required by this job include Close vision, Depth perception and Ability to adjust focus.

The above statements are intended to describe the general nature and level of work being performed by individuals assigned to this position. They are not intended to be an exhaustive list of all duties, responsibilities and skills required by personnel so classified. This Institute promotes Equal Employment Opportunity workplace that includes reasonable accommodations to otherwise qualified, disabled applicants and employees.